

EPA Region 5 Records Ctr.

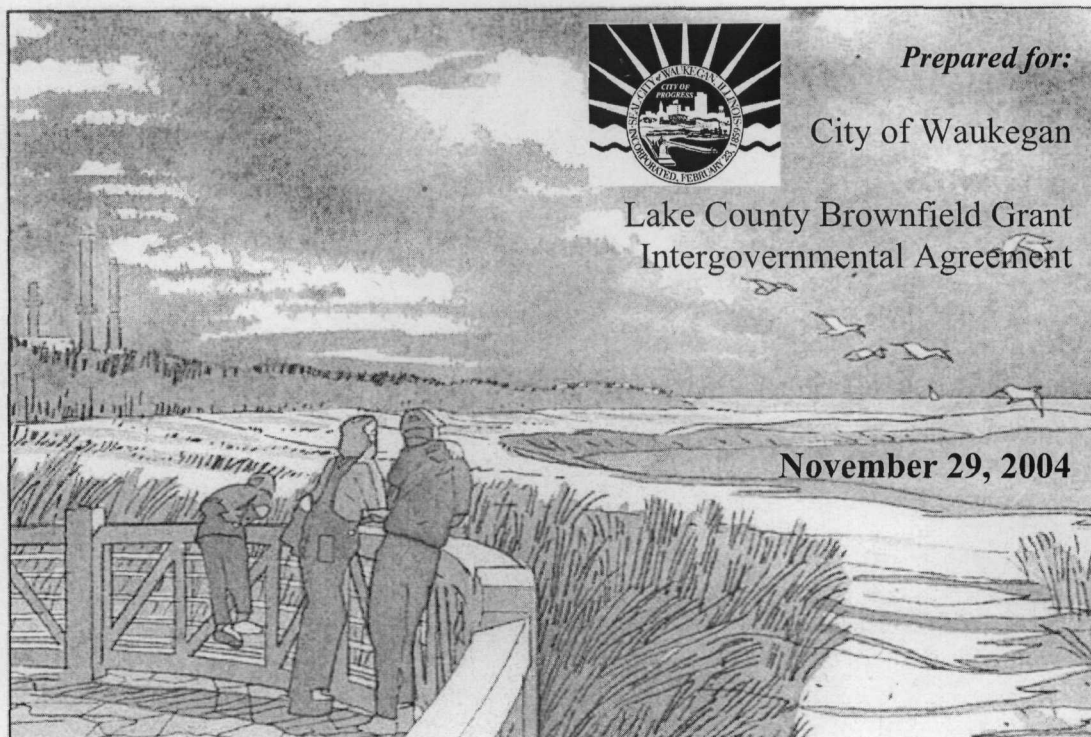


272961

847 362 9356

Environmental Site Investigation Report

Former OMC Waukegan Property
Lake Michigan Lakefront Study Area



Graphic from A 21st Century Vision for Waukegan's Downtown and Lakefront, SOM, July 2003

Prepared by:



Deigan & Associates, LLC

Environmental Consultants

1309 Hackberry Ct.

Libertyville, IL. 60048

www.deiganassociates.com



Table of Contents

1.	Background & Objectives.....	3
	1.1 Prior Land Uses	
	1.2 Objectives of Environmental Investigation	
	1.3 Current Site Setting & Conditions	
2.	Scope of Investigation.....	5
	2.1 Basis of Investigation	
	2.2 Reconnaissance for Habitat Identification, Delineation & Protection	
	2.3 Site Investigation Approach	
	2.3.1 Subsurface Soils	
	2.3.2 Sediments	
	2.3.3 Shallow Groundwater	
	2.3.4 Reconnaissance for Asbestos Debris	
3.	Report of Findings.....	10
	3.1 Subsurface Soil Data/Findings	
	3.2 Sediment Data/Findings	
	3.3 Shallow Groundwater Data/Findings	
4.	Recommendations.....	17

List of Figures

- 1 Study Area
- 2 Sample Location Map

List of Tables

- 1 Soil Sampling & Analysis Plan
- 2 Sediment Sampling & Analysis Plan
- 3 Groundwater Sampling & Analysis Plan
- 4 Soil Data Compared to TACO Tier I Soil Remediation Objectives
- 5 Sediment Data Compared to TACO Tier I Soil Remediation Objectives
- 6 Sediment Data Compared to IEPA Sediment Quality Guidelines
- 7 Groundwater Compared to TACO Class I Groundwater Remediation Objectives

List of Appendices

- A Site Photos
- B Soil Boring/Monitor Well Logs
- C Laboratory Data Package



1.0 Background & Objectives

1.1 Prior Land Uses

The Outboard Marine Corporation (OMC) North Plant (Plant No. 2) was constructed in several phases between 1949 and 1975. The western portion of the plant was purchased by OMC from EJ&E Railroad Co. in 1948. The easternmost 47 acres of the Plant 2 property was purchased by OMC from Abbott Laboratories in 1956. A landfill area was operated by Abbott on the adjoining northwest properties that are now developed by the North Shore Sanitary District. In December 2000, OMC permanently closed its Waukegan lakefront manufacturing plants, declared bankruptcy and has not sought re-organization. Local, State and Federal government are working cooperatively to address the environmental impact left by OMC. Several areas of the North Plant property have been designated by the United States Environmental Protection Agency (USEPA) as Superfund operable units and are being investigated and/or remediated under the USEPA Superfund program. *The easternmost portion of the OMC North Plant appears to have been largely undisturbed property which abuts the Lake Michigan shoreline. This approximate 13 acre land area on the easternmost side of the OMC North Plant is the subject of this report.*

1.2 Objectives of Environmental Investigation

The City of Waukegan is working cooperatively with USEPA and Illinois EPA to address the abandonment of all former OMC properties on the Waukegan lakefront. The City currently has an option to acquire various parcels of the OMC North Plant and is working with the State and Federal governments to sign a Consent Decree that will allow the City to take ownership of the property and to perform certain operation & maintenance (O&M) activities at the property.

The objective of this environmental investigation was to obtain information needed to re-open public access to the Lake Michigan waterfront area of the OMC North Plant property and to establish a habitat conservation zone within the waterfront area. A possible future goal would be to have the fenced access gates on the north side of Sea Horse Drive re-located and public access established (after it can be demonstrated that the area poses no unacceptable human health and/or environmental risks). Controlled recreational use of the waterfront portion of the OMC North Plant area between the existing City Municipal Beach and the North Shore Sanitary District property may also be considered. Access to the OMC North Plant's abandoned former manufacturing, process and waste containment areas will remain restricted until such time that environmental conditions allow for safe public access, redevelopment and re-use.

An environmental site investigation was conducted to assess environmental conditions on the lakefront portion of the former OMC North Plant Property. This investigation focused on collection of data that is needed to determine if existing conditions pose a threat to human health and the environment.

The site investigation was performed for the following objectives:

- Identify and delineate potentially sensitive habitats in the study area and protect such habitats during the site investigation work.
- Test soil, sediment, and shallow groundwater in the study area for the presence of chemical constituents.
- Evaluate the levels of chemical constituents measured in soil, sediment, and groundwater samples by comparing such levels to human health risk-based standards and screening levels.
- Coordinate the findings of this focused site investigation with other related investigations and make recommendations as to future tasks leading to re-use and conservation of the lakefront study area.

1.3 Current Site Setting & Conditions

Figure 1 depicts the study area, which includes approximately 1,200 feet (ft) of waterfront. The study area is generally inaccessible from Sea Horse Drive North to the North Shore Sanitary District's southern property boundary. This lakefront property study area is approximately 13 acres.

Historically, the study area was never developed with surface structures or infrastructure. During past periods, Lake Michigan lake water levels had inundated a portion of the study area and some shoreline protection boulders are present along the west side of the study area indicating past lake water levels. Since this time, Lake Michigan water levels have retreated revealing additional beach area. Vegetation has been re-established in some areas of the lakefront parcel where wind and wave action do not impact the emergence of plant life.

Soils consist of very fine to fine native sands underlain by a silty clay till unit that extends to a depth of 110 ft. Depth to groundwater is 2 to 5 ft. below ground surface (bgs) and is highly influenced by Lake Michigan water levels. Soils encountered during the site investigation were consistently brown to gray fine sand, well sorted, loose to medium dense. Saturated sands were observed around elevations of 94.9 to 95.7 feet (site reference elevations, not USGS), based on survey stake marker information. Based on static water level measurements taken from temporary monitoring wells installed during the site investigation, the localized groundwater flow appears to be northerly.

The North Shore Sanitary District's (NSSD) secondary outfall adjoins the study area to the north and joins up with the North Ditch of the OMC Plant. Wind and wave action have shifted the NSSD outfall flow and carved a surface swale across the northeastern portion of the study area. A stormwater ditch and large swale that is beginning to develop

into a wetland area also borders the southern portion of the study area east of Sea Horse Drive.

2.0 Scope of Investigation

In determining environmental conditions in the study area, a site investigation was conducted in the study area of the property as outlined herein.

2.1 Basis of Investigation

The environmental conditions on the adjoining OMC North Plant, the former Abbott landfill, the Waukegan Manufactured Gas (WMG) and Coke Plant site and the Johns-Manville site have the potential to have impacted the study area and provide a basis for this site investigation. Prior releases of hazardous substances from the OMC North Plant are documented in various references. Polychlorinated biphenyls (PCBs), heavy metals, volatile organic compounds, and various petroleum and chlorinated hydrocarbons are contaminants of concern at the OMC property. A groundwater plume emanating from the former trichloroethene (TCE) degreasing unit has been found to extend to wells immediately west of the study area.

Asbestos-containing debris has been found on certain lakefront sites, including Illinois Beach State Park, the Midwest Generation fishing pier area and properties in the vicinity of the Johns-Manville Superfund site located north of the subject property.

A groundwater plume emanating from the former WMG & Coke Plant site has documented groundwater impact at monitoring wells in the Municipal beach area immediately south of the study area. Groundwater constituents of concern from the former WMG & Coke Plant site include arsenic, nitrates, sulfates, ammonia, cyanide, phenols, and thiocyanate.

2.2 Reconnaissance for Habitat Identification, Delineation & Protection

As a first step in the site investigation, a land surveyor staked a 100 ft. rectangular grid system across the Study Area. A terrestrial ecologist then conducted a site walk over during the week of 23 July 2004. A systematic reconnaissance survey was used by the ecologist to identify and map potential sensitive habitats, wetlands, and biota. Field flagging was utilized to delineate such areas. The flagging were also used as visual barriers for the subsequent Geoprobe rig and sampling personnel, thereby serving as conservation and protective habitat measures during the site investigation.

In summary, the ecologist's meander survey of the existing flora and plant communities of the OMC site (north of the Waukegan Beach area) resulted in two state endangered plant species being found and three areas of wetland communities being identified.

The study area is characterized as being a dry sand prairie/foredune community dominated by marram grass (*Amophila beviligulata*), little bluestem grass (*Schizachyrium*



scoparium) and sand reed (*Calamovilfa longifolia*). Forb diversity is quite low with most of the species, often represented by only one or two individuals, occurring along a narrow strip on the west edge of the property. Forb diversity includes such species as butterfly weed (*Asclepias tuberosa*), horse mint (*Monarda punctata villicaulis*), beach wormwood (*Artemisia caudata*), rough blazing star (*Liatris aspera*) and old field goldenrod (*Solidago nemoralis*).

Some depressional areas within the sand prairie/ foredune community contain fairly large populations of lake shore rush (*Juncus balticus littoralis*), suggesting that these areas are nearer to the water table. However, lack of significant wetland associates in these areas did not warrant flagging these sites as wetlands to be avoided.

The two state endangered species found on the site are in this prairie community. The two species include:

- Marram grass (*Amophila breviligulata*), the dominant grass cover, and
- Kalm's St. John's wort (*Hypericum kalmianum*).

The *Amophila*, which serves the important function of stabilizing the sand dunes, dominates the site and is found evenly dispersed in a near continuous cover across the entire area and was therefore not flagged. The *Hypericum* population is represented by 6-8 plants located in the southwest corner of the property. This population was flagged with orange pin flags to avoid disturbance.

Three wetland areas are represented by drainage ditches on the north and south edges of the property and by a small depression along the north ditch near the lakeshore. The small depression was flagged with orange pin flags to avoid disturbance. A narrow terrace along the north side of the south drainage ditch contained significant amounts of conservative wetland species (i.e., a species when observed in an area gives a high degree of confidence that the plant is from a remnant natural area) including;

- Ohio goldenrod (*Solidago ohioensis*),
- Richardson's rush (*Juncus alpinus rariflorus*),
- Prairie wedge grass (*Sphenopholis obtusata*), and
- Green twayblade orchids (*Liparis loeselii*).

The small population of green twayblade orchids was found along the north side of the south drainage ditch in the southwest corner of the property. This population was marked with orange flagging ribbon to avoid disturbance.

2.3 Site Investigation Approach

Figure 2 presents an overview of the site investigation for the study area. Tables 1 through 3 list the analytical protocol for each of the sampled matrices (i.e., soil, sediment and groundwater). Sample locations were established using field survey techniques.

2.3.1 Subsurface Soils

A grid pattern (See Figure 2) of surface and subsurface borings for soil was established. The first phase for the site investigation utilized a grid sampling interval of 200 feet. Since PCB contamination was found at concentrations above the IEPA soil remediation objectives, a second phase was conducted, which tightened the grid to focus on extent of PCB impact. In areas of poor accessibility, soil boring locations were offset slightly from the survey stakes. Field survey measurements were taken to record the boring offsets.

The first phase sampling of the site investigation was conducted between 28 and 30 July 2004. A second phase of sampling was conducted between 8 and 11 October 2004. Borings were advanced using a Geoprobe direct push sampling technique. To minimize disturbance of the surface soils and natural habitat, a small track mounted Geoprobe rig with low ground pressure pads was utilized. The macro core and related sampling equipment were decontaminated between each sample drive with distilled water and non-phosphate cleaning agent.

Composite soil samples were collected from the 0 to 3-foot and 5 to 8-foot soil intervals. The lower interval represented the interface of the groundwater/vadose zone. The composite soil samples collected during the first sampling event were analyzed for semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs) and pH. Discrete soil samples were collected at 2 and 6 feet bgs using USEPA Method 5035 Purge and Trap VOC sampling techniques. The discrete samples were analyzed for volatile organic compounds (VOCs). The composite samples collected during Phase 2 were only analyzed for PCBs.

During the soil sampling, a MinnieRae2000 photoionization detector (PID) was used to field screen for potential VOCs. Soils were classified by a field geologist, and logs were prepared to document the subsurface soil conditions (see Attachment B). Upon completion of each soil boring, bentonite chips were placed into the borehole up to surrounding grade. If any soil boring was offset from the original survey stake, measurements were recorded on the logs to document the modified locations.

Table 1 summarizes the sample grid locations and lists the analytical protocol for soil samples collected during both phases of the Site Investigation.

Table 1—Soil Sampling and Analysis Plan

Soil Probe Sample	Sample Depth (ft bgs)	Grid Location	Lab Parameters
S-01	0-3 and 5-8	E000, N200	PCBs, Metals, SVOCs, VOCs, pH
S-02	0-3 and 5-8	E200, N200	PCBs, Metals, SVOCs, VOCs, pH
S-03	0-3	E400, N200	PCBs, Metals, SVOCs, VOCs, pH
S-04	0-3 and 5-8	E000, N400	PCBs, Metals, SVOCs, VOCs, pH
S-05	0-3 and 5-8	E200, N400	PCBs, Metals, SVOCs, VOCs, pH
S-06	0-3	E400, N400	PCBs, Metals, SVOCs, VOCs, pH

Table 1—Soil Sampling and Analysis Plan (Continued)

Soil Probe Sample	Depth (ft bgs)	Grid Location	Lab Parameters
S-07	0-3 and 5-8	E000, N600	PCBs, Metals, SVOCs, VOCs, pH
S-08	0-3 and 5-8	E200, N600	PCBs, Metals, SVOCs, VOCs, pH
S-09	0-3	E400, N600	PCBs, Metals, SVOCs, VOCs, pH
S-10	0-3 and 5-8	E000, N800	PCBs, Metals, SVOCs, VOCs, pH
S-11	0-3 and 5-8	E200, N800	PCBs, Metals, SVOCs, VOCs, pH
S-12	0-3	E400, N800	PCBs, Metals, SVOCs, VOCs, pH
S-13	0-3 and 5-8	E000, N1000	PCBs, Metals, SVOCs, VOCs, pH
S-14	0-3 and 5-8	E200, N1000	PCBs, Metals, SVOCs, VOCs, pH
S-15	0-3 and 5-8	E200, N700	PCBs
S-16	0-3 and 5-8	E200, N900	PCBs
S-17	0-3 and 5-8	E300, N800	PCBs
S-18	0-3 and 5-8	E100, N900	PCBs
S-19	0-3 and 5-8	E100, N800	PCBs
S-20	0-3 and 5-8	E100, N700	PCBs
S-21	0-3 and 5-8	E100, N600	PCBs
S-22	0-3 and 5-8	E100, N500	PCBs
S-23	0-3 and 5-8	E100, N1000	PCBs
S-24	0-3 and 5-8	E100, N1100	PCBs
S-25	0-3 and 5-8	E000, N1100	PCBs
S-26	0-3 and 5-8	E000, N900	PCBs
S-27	0-3 and 5-8	E000, N700	PCBs
S-28	0-3 and 5-8	E000, N500	PCBs

2.3.2 Sediments

During the first round of sampling, sediment samples were collected as part of the site investigation at approximate 200-foot station intervals (Figure 2) along a north and south drainage ditch. This sediment sampling was conducted on 29 July 2004. Phase 2 sediment sampling was conducted on 11 October 2004, with samples located between Phase 1 sample locations, resulting in an approximate 100-foot station interval throughout both ditches. A total of nine sediment samples were collected along the north ditch and five sediment samples were collected along the south ditch. Stainless steel sampling tools were used to obtain sediments from the sediment surface to approximately 6-inches. The sampling tools were decontaminated with distilled water and non-phosphate cleaning agent between each sampling station. The sediment samples analyzed for SVOCs, metals, PCBs and pH. Two sediment samples were also analyzed for total organic carbon content (TOC). Table 2 summarizes the sediment sample locations and analytical protocol used in the Site Investigation.

Table 2--Sediment Sampling & Analysis Plan

Sediment Sample	Location/Station Interval	Lab Parameters
<i>North Ditch</i>		
N-sed-01	Confluence of OMC N. Ditch and NSSD Outfall	PCBs, Metals, SVOCs, pH, Total Organic Carbon
N-sed-02	+200 ft. Southeast	PCBs, Metals, SVOCs
N-sed-03	+200 ft. Southeast	PCBs, Metals, SVOCs
N-sed-04	+200 ft. Southeast	PCBs, Metals, SVOCs
N-sed-05	+200 ft. Southeast	PCBs, Metals, SVOCs
N-sed-06	+100 ft. West of N-sed-01	PCBs, arsenic, SVOCs
N-sed-07	+100 ft. Southeast of N-sed-01	PCBs, arsenic, SVOCs
N-sed-08	+100 ft. Southeast of N-sed-03	PCBs, arsenic, SVOCs
N-sed-09	+100 ft. Southeast of N-sed-04	PCBs, arsenic, SVOCs
<i>South Ditch</i>		
S-sed-01	Outfall East of Sea Horse Dr.	PCBs, Metals, SVOCs, pH, TOC
S-sed-02	+ 200 ft. East	PCBs, Metals, SVOCs
S-sed-03	+200 ft. East	PCBs, Metals, SVOCs
S-sed-04	+100 ft. East of S-sed-02	PCBs, arsenic, SVOCs
S-sed-05	+100 ft. East of S-sed-01	PCBs, arsenic, SVOCs

2.3.3 Shallow Groundwater

During the first round of sampling investigation, three of the Geoprobe soil boring locations were constructed as shallow monitoring wells. All three of the wells were installed on 29 July 2004. During the follow-up sampling investigation, an additional Geoprobe soil boring locations was constructed as a shallow monitoring well. This well was installed on 11 October 2004. Stainless steel well screens equipped with well points were installed using the Geoprobe equipment. The slotted screens had 3-foot lengths and 1.5-inch outside diameters. The riser pipe was also composed of stainless steel having 1.5-inch diameters. The well screen bottom depths were all placed to 10 feet bgs. Steel locking flush-mount well protectors were placed around each monitor wellhead. A concrete pad (collar) was placed around each protector.

On 30 July 2004, the three wells (MW-1, MW-2, and MW-3) were developed using hand bailer methods, removing groundwater until stabilized conditions occurred. Prior to development, static water levels were obtained at each well. Water level measurements were compared with the survey stake elevations located adjacent to each well. Clean disposable 0.75-inch diameter polyurethane bailers were used to obtain the groundwater samples immediately after each well static water levels stabilized. On 11 October 2004, all four monitoring wells were developed following the same procedures. During both rounds of sampling, the groundwater samples were analyzed for VOCs, metals, cyanide, ammonia, phenols, nitrates, pH, thiocyanate, and specific conductance (SC). Insufficient sample volume was recovered from MW-1 during the second round of sampling, thus this sample was analyzed for VOCs only.

Table 3 summarizes the groundwater sampling and analytical protocol used for the Site Investigation. Figure 2 shows the well locations.

Table 3—Groundwater Sampling & Analysis Plan

Well Designation/Location	Lab Parameters
MW-01 (North; E200, N1000)	VOCs, metals, pH, SC, thiocyanate, cyanide, ammonia, phenols, nitrates; VOCs only during 2 nd round of sampling
MW-02 (Southwest; E100, N100)	VOCs, metals, pH, SC, thiocyanate, cyanide, ammonia, phenols, nitrates
MW-03 (Central East; E400, N400)	VOCs, metals, pH, SC, thiocyanate, cyanide, ammonia, phenols, nitrates
MW-04 (Central; E200, N600)	VOCs, metals, pH, SC, thiocyanate, cyanide, ammonia, phenols, nitrates

2.3.4 Reconnaissance for Asbestos Debris

Throughout the course of the investigation, the study area was examined for surface and near surface debris and potential asbestos-containing material (ACM). In the event that suspect materials were identified, samples would have been collected and laboratory tested for asbestos content by polarized light microscopy (PLM). During the Site Investigation, no ACMs were observed. Therefore, no samples were collected for PLM analysis.

2.3.5 Data Quality Objectives

Sampling protocols and laboratory methods followed IEPA and USEPA-approved methods. Illinois EPA practical quantitation limits (PQLs) established under the Illinois Site Remediation Program and TACO regulations were used by the laboratory. Laboratory analysis was conducted by an Illinois EPA-accredited laboratory, STL Laboratories, Inc. of University Park, Illinois.

3.0 Report of Findings of Site Investigation

Results of sampling and analysis of chemical data were assessed through comparison with IEPA published risk-based remediation objectives. The IEPA Tiered Approach to Cleanup Objectives (TACO) in 35 IAC Part 742, Tier I for residential settings was used for soil and sediment data comparison. The Class I groundwater remediation objectives were used in comparing the shallow groundwater data. In addition, IEPA sediment quality guidelines were used in comparing the sediment results.

3.1 Subsurface Soils Data/Findings

The first round of soil analytical data indicated that no SVOCs were detected above the Tier I soil remediation objectives (SROs). The metals concentrations were within the

accepted IEPA background range for metropolitan areas. Exceedances of PCBs above the Tier I SRO (1 mg/kg) were documented at locations S-07, S-10, S-1, S-13, S-18, S-19, S-29, S-23, S-25, S-26, and S-27. The PCB concentrations ranged from 1.6 to 730 mg/kg. The highest concentrations were found in the northwest corner of the site near the OMC North Ditch and the eastern OMC PCB containment cell. Figure 2 depicts these PCB impacted areas. High PCB concentrations at boring locations S-23 and S-25 are most noteworthy. Table 4 summarizes the PCB analytical results which exceed the IEPA Tier 1 residential standard.

Table 4
Soil Data Compared to TACO Tier 1 Soil Remediation Objectives
All concentrations in mg/kg

Sample ID	Chemical Compound Exceeding IEPA SRO	Measured Concentration (mg/kg)	IEPA Tier 1 Residential Soil Remediation Objective (SRO)
S-7 (0-3 ft)	Aroclor 1248	1.7	1
S-10 (0-3 ft)	Aroclor 1248	2.5	1
S-11 (5-8 ft)	Aroclor 1242	1.6	1
S-13 (0-3 ft)	Aroclor 1242	2.8	1
S-18 (0-3 ft)	Aroclor 1248	1.2	1
S-18 (5-8 ft)	Aroclor 1248	1.2	1
S-19 (5-8 ft)	Aroclor 1248	1.8	1
S-20 (5-8 ft)	Aroclor 1248	2	1
S-23 (5-8 ft)	Aroclor 1248	280	1
S-25 (0-3 ft)	Aroclor 1248	730	1
S-25 (5-8 ft)	Aroclor 1248	690	1
S-26 (0-3 ft)	Aroclor 1248	2.1	1
S-26 (5-8 ft)	Aroclor 1248	8.1	1
S-27 (0-3 ft)	Aroclor 1248	9.8	1

3.2 Sediment Data/Findings

The analytical results for sediment samples document elevated PCB concentrations at the north drainage ditch locations SED-01, SED-04, SED-06, and SED-07, with concentrations ranging from 1.5 mg/kg to 12 mg/kg. These levels exceed the IEPA Tier I SRO. Slightly elevated levels of one SVOC, benzo(a)pyrene, was documented at locations SED-01, SED-06, and SED-07, with concentrations ranging from 0.15 mg/kg to 0.35 mg/kg. Although this SVOC was above the Tier I SRO, it was below the IEPA's published background level. The metal arsenic was found to have a slightly elevated concentration of 15 mg/kg at location SED-02, with higher concentrations at upstream locations SED-06 (160 mg/kg) and SED-07 (31 mg/kg). This metal exceeded both the Tier I SRO and the IEPA background level. The highest concentrations of all elevated constituents were measured in SED-06, which is the most upstream sample and is closest to the former OMC North Plant discharge. No constituents exceeded Tier I SRO at locations SED-05, SED-08, and SED-09. The summary of sediment results are shown on Table 5. The north drainage ditch sediment sample results were also compared to the

IEPA ecological sediment quality standards. The concentrations of PCBs, arsenic and PAHs were also above these standards, and are shown on Table 6.

For the south drainage ditch sediment samples, the analytical results documented elevated PCB concentrations at SED-01, SED-02, SED-04, and SED-05. The PCB concentrations ranged from 5.8 mg/kg at SED-01 to 150 mg/kg at SED-02. These concentrations exceed the Tier I SRO. The metal arsenic exceeded the Tier I SRO and IEPA background with a concentration of 22 mg/kg at SED-02 and 37 mg/kg at SED-05. At SED-02, lead exceeded the IEPA background, having a concentration of 39 mg/kg. This concentration; however, does not exceed the Tier I SRO. Five SVOCs were detected having concentrations above the Tier I SRO; however, they did not exceed or only slightly exceeded the IEPA background levels. These SVOCs included benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(ah)anthracene, and indeno(1,2,3-cd)pyrene. Dibenzo(a,h)anthracene and benzo(b)fluoranthene slightly exceeded background at SED-05. No exceedances were found in SED-03, the most downstream sample location. These results are shown on Table 5. The results of the south drainage ditch sediment samples were also compared to the IEPA ecological sediment quality standards for PCBs, arsenic, copper, and PAHs. These results are shown on Table 6.

Table 5
Sediment Data Compared to TACO Tier 1 Soil Remediation Objectives
All concentrations in mg/kg

Sample ID	Chemical Compound Exceeding IEPA SRO	Measured Concentration	IEPA Tier 1 Residential Soil Remediation Objective	IEPA Background (within MSA)
North SED-01	Aroclor 1248	4.6	1	--
	Benzo(a)pyrene	0.16	0.09	2.14
North SED-02	Arsenic	15	--	13
North SED-04	Aroclor 1248	1.5	1	--
North SED-05	No constituents exceed Tier 1 SRO			
North SED-06	Aroclor 1016	3.5 U	1	--
	Aroclor 1221	3.5 U	1	
	Aroclor 1232	3.5 U	1	
	Aroclor 1242	3.5 U	1	
	Aroclor 1248	12	1	
	Aroclor 1254	3.5 U	1	
	Aroclor 1260	3.5 U	1	
	Arsenic	160	--	13
	Benzo(a)pyrene	0.35	0.09	2.14
North SED-07	Aroclor 1248	1.7	1	
	Arsenic	31	--	13
	Benzo(a)pyrene	0.15	0.09	2.14
North SED-08	No constituents exceed Tier 1 SRO			
North SED-09	No constituents exceed Tier 1 SRO			

Table 5 (continued)
Sediment Data Compared to TACO Tier 1 Soil Remediation Objectives
All concentrations in mg/kg

Sample ID	Chemical Compound Exceeding IEPA SRO	Measured Concentration	IEPA Tier 1 Residential Soil Remediation Objective	IEPA Background (within MSA)
South SED-01	Aroclor 1248	5.8	1	--
	Benzo(a)pyrene	0.14	0.09	2.14
South SED-02	Aroclor 1016	22 U	1	--
	Aroclor 1221	22 U	1	--
	Aroclor 1232	22 U	1	--
	Aroclor 1242	22 U	1	--
	Aroclor 1248	150	1	--
	Aroclor 1254	22 U	1	--
	Aroclor 1260	22 U	1	--
	Arsenic	22	--	13
	Benzo(a)pyrene	0.92	0.09	2.14
	Benzo(b)fluoranthene	1.5	0.9	2.05
	Dibenzo(ah)anthracene	0.11	0.09	0.422
	Lead	39	400	36
South SED-03	No constituents exceed Tier 1 SRO			
South SED-04	Aroclor 1016	2.1 U	1	--
	Aroclor 1221	2.1 U	1	--
	Aroclor 1232	2.1 U	1	--
	Aroclor 1242	2.1 U	1	--
	Aroclor 1248	8.7	1	--
	Aroclor 1254	2.1 U	1	--
	Aroclor 1260	2.1 U	1	--
	Benzo(a)pyrene	0.2	0.09	2.14
South SED-05	Aroclor 1016	14 U	1	--
	Aroclor 1221	14 U	1	--
	Aroclor 1232	14 U	1	--
	Aroclor 1242	14 U	1	--
	Aroclor 1248	76	1	--
	Aroclor 1254	14 U	1	--
	Aroclor 1260	14 U	1	--
	Arsenic	37	--	13
	Benzo(a)anthracene	1.6	0.9	1.84
	Benzo(a)pyrene	1.7	0.09	2.14
	Benzo(b)fluoranthene	2.6	0.9	2.05
	Dibenzo(a,h)anthracene	0.47	0.09	0.422
	Indeno(1,2,3-cd)pyrene	1.3	0.9	1.552

NA = Not available.

MSA = Metropolitan Statistical Area

U = Not detected above method detection limit. Elevated detection limits are reported due to high concentrations of other Aroclors.

-- = Not available.

Table 6
Sediment Data Compared to IEPA Sediment Quality Guidelines
All concentrations in mg/kg

Sample ID	Chemical Compound Exceeding IEPA Sediment Quality Guideline	Measured Concentration (mg/kg)	IEPA Provisional Classification: Non-elevated	IEPA Provisional Classification: Highly Elevated	IEPA Baseline Sediment Cleanup Objectives for Petroleum Product Releases
North SED-01	Aroclor 1248	4.6	<0.01	0.48	--
	Arsenic	12	7.2	18	--
	Benzo(a)pyrene	0.16	--	--	0.073
North SED-02	Aroclor 1248	0.90	<0.01	0.48	--
	Arsenic	15	7.2	18	--
North SED-03	Aroclor 1248	0.56	<0.01	0.48	--
	Arsenic	9.7	7.2	18	--
North SED-04	Aroclor 1248	1.5	<0.01	0.48	--
	Arsenic	18	7.2	18	--
North SED-06	Anthracene	0.099			
	Aroclor 1248	12	<0.01	0.48	--
	Arsenic	160	7.2	18	--
	Benzo(a)anthracene	0.39	--	--	0.287
	Benzo(a)pyrene	0.35	--	--	0.073
	Chrysene	0.45	--	--	0.400
	Fluorene	0.059	--	--	0.035
	Pyrene	0.78	--	--	0.350
North SED-07	Aroclor 1248	1.7	<0.01	0.48	--
	Arsenic	31	7.2	18	--
	Benzo(a)pyrene	0.15	--	--	0.073
North SED-08	Aroclor 1248	0.70	<0.01	0.48	--
	Arsenic	13	7.2	18	--
North SED-09	Aroclor 1248	0.068	<0.01	0.48	--
	Arsenic	6.7	7.2	18	--

Table 6 (continued)
Sediment Data Compared to IEPA Sediment Quality Guidelines
All concentrations in mg/kg

Sample ID	Chemical Compound Exceeding IEPA Sediment Quality Guideline	Measured Concentration (mg/kg)	IEPA Provisional Classification: Non-elevated	IEPA Provisional Classification: Highly Elevated	IEPA Baseline Sediment Cleanup Objectives for Petroleum Product Releases
South SED-01	Aroclor 1248	5.8	<0.01	0.48	--
	Arsenic	11	7.2	18	--
	Benzo(a)pyrene	0.14	--	--	0.073
South SED-02	Aroclor 1248	150	<0.01	0.48	--
	Arsenic	22	7.2	18	--
	Benzo(a)anthracene	0.53	--	--	0.287
	Benzo(a)pyrene	0.92	--	--	0.073
	Benzo(b)fluoranthene	1.5	--	--	0.886
	Chrysene	1.1	--	--	0.4
	Copper	55	37	170	--
	Dibenzo(ah)anthracene	0.11	--	--	0.06
	Flourene	0.036	--	--	0.035
	Pyrene	1.2	--	--	0.35
South SED-03	Aroclor 1248	4.9	<0.01	0.48	--
	Benzo(a)pyrene	0.080	--	--	0.073
South SED-04	Aroclor 1248	8.7	<0.01	0.48	--
	Benzo(a)pyrene	0.2	--	--	0.073
	Pyrene	0.5	--	--	0.35
South SED-05	Anthracene	0.34	--	--	0.085
	Aroclor 1248	76	<0.01	0.48	--
	Arsenic	37	7.2	18	--
	Benzo(a)anthracene	1.6	--	--	0.287
	Benzo(a)pyrene	1.7	--	--	0.073
	Benzo(b)fluoranthene	2.6	--	--	0.886
	Chrysene	3.0	--	--	0.40
	Dibenzo(a,h)anthracene	0.47	--	--	0.06
	Fluoranthene	4.8	--	--	2.79
	Fluorene	0.21	--	--	0.035
	Phenanthrene	2.7	--	--	0.81
	Pyrene	4.2	--	--	0.35

Short, Matthew. 1997. Evaluation of Illinois Sieved Stream Sediment Data 1982-1995. IEPA, Bureau of Water. August 1997.

Only constituents positively detected at concentrations exceeding sediment guidelines are presented; no exceedance was measured at North SED-05.

3.3 Shallow Groundwater Data/Findings

The analytical results for the two rounds of groundwater samples indicate concentrations of certain metals above the IEPA Class I groundwater remediation objectives. The

metals commonly exceeding these objectives included arsenic, barium, chromium, iron, lead, manganese, nickel, vanadium and zinc. These results are shown on Table 7.

Table 7
Groundwater Compared to TACO Class I Groundwater Remediation Objectives
All concentrations in mg/L

Sample ID	Chemical Compound Exceeding Class I Groundwater Remediation Objective	Round 1 Measured Concentration	Round 2 Measured Concentration	Class I Groundwater Remediation Objective
MW-01	Barium	4	NA	2
	Chromium	0.35	NA	0.1
	Iron	86	NA	5
	Lead	0.24	NA	0.0075
	Manganese	2.6	NA	0.15
	Nickel	0.17	NA	0.1
	Vanadium	0.077	NA	0.049
	Zinc	29	NA	5
	Thiocyanate	<0.1	NA	--
MW-02	Arsenic	0.074	0.11	0.05
	Chromium	0.43	0.12	0.1
	Iron	43	28	5
	Lead	0.32	0.15	0.0075
	Manganese	1.1	0.67	0.15
	Nickel	0.2	< GRO	0.1
	Zinc	25	14	5
	Thiocyanate	<0.1	<0.10	--
MW-03	Chromium	0.11	< GRO	0.1
	Iron	38	24	5
	Lead	0.18	0.15	0.0075
	Manganese	0.92	0.6	0.15
	Zinc	21	15	5
	Thiocyanate	<0.1	<0.10	--
MW-04	Cadmium	NA	0.006	0.005
	Chromium	NA	0.22	0.1
	Iron	NA	44	5
	Lead	NA	0.073	0.0075
	Manganese	NA	1.8	0.15
	Nickel	NA	0.17	0.1
	Thiocyanate	<0.1	<0.10	--

Round 1 samples collected 30 July 2004.

Round 2 samples collected 11 October 2004.

< Detected concentration below groundwater remediation objective (GRO).

NA - Not analyzed; sufficient sample volume not available for collection.

-- = No groundwater remediation objective available.



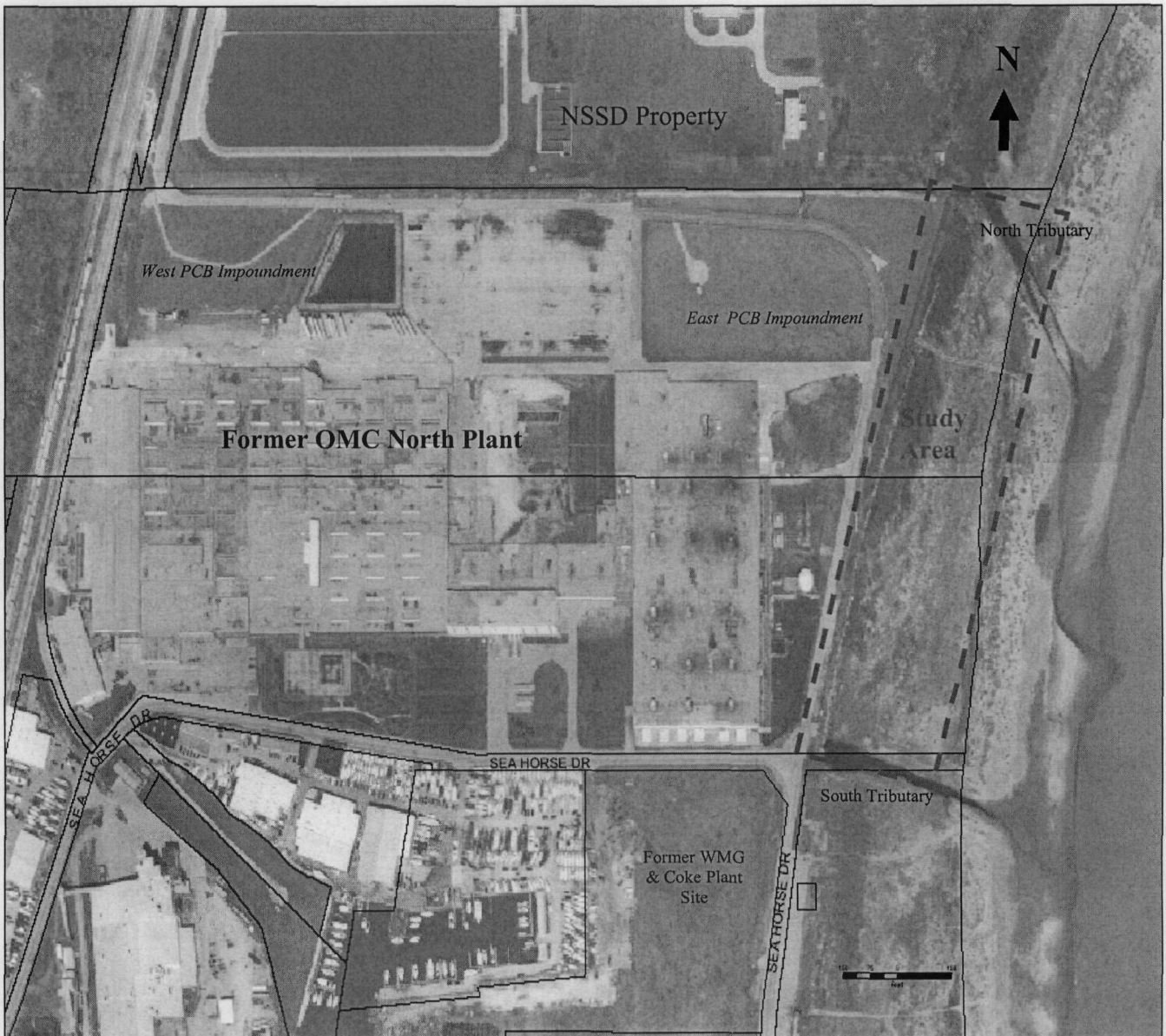
4.0 Recommendations

The results of this environmental investigation are encouraging and continue to support future use of the study area east of the OMC North Plant for conservation open space, passive recreational use, and natural habitat development. Despite the legacy of industrial use and releases of hazardous substances from the OMC North Plant and its related Superfund Site Operable Units, the 13-acre lakefront portion of the property has remained for the most part not impacted by hazardous substance releases.

USEPA's Remedial Project Manager for the OMC Site will be informed of the presence of moderately elevated PCB and Arsenic concentrations in the North and South tributaries and high PCB concentrations in soil in the northwest corner of the property via transmittal of this report. Areas of elevated PCB concentrations have been found in soil which appears to be limited to the northwest corner of the study area and in sediments of the north and south tributaries. There is potential for direct contact with this PCB-contaminated soil and sediment and potential for migration to Lake Michigan. Soil at borings S-23 and S-25 reported PCB concentrations ranging from 280 mg/kg to 730 mg/kg in the vicinity of the eastern PCB containment cell and the previously remediated North Ditch Area. Public access to these areas should continue to be restricted until further contaminant removal and/or containment is conducted. Currently, natural vegetative and water barriers are present that may preclude access to PCBs in sediments in the north and south tributaries.

Other areas of the study area appear acceptable for planning limited public access and continued natural habitat restoration and protection consistent with the City of Waukegan's Lakefront Master Plan.

Figure 1
Environmental Investigation Study Area



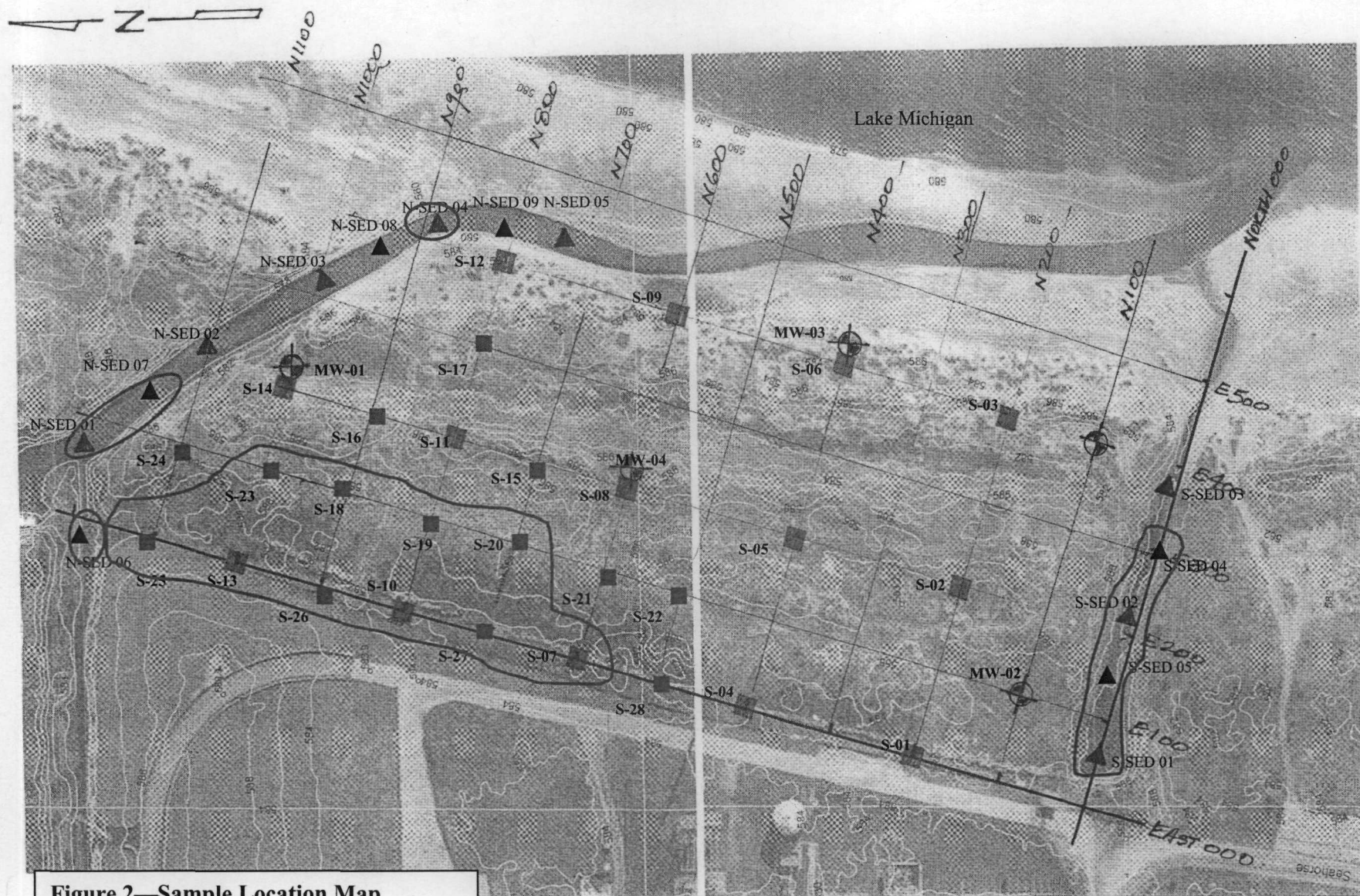


Figure 2—Sample Location Map

MW—Monitoring Well
 SED—Sediment Sample
 S—Soil Probe Sample Location

July 2004 and October 2004 Data:

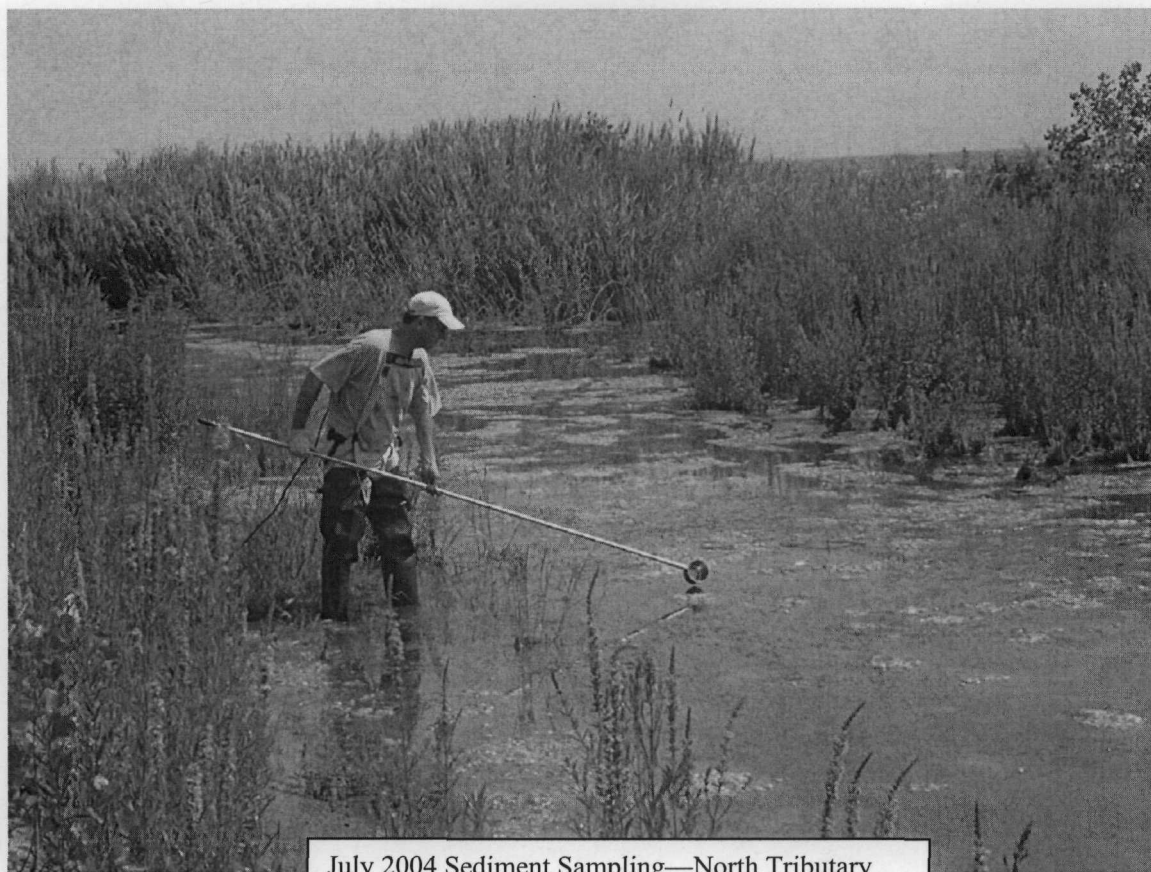
PCB Soil Exceedances: S-7, S-10, S-11, S-13, S-18, S-19, S-20, S-23, S-25, S-26, S-27

PCB Sediment Exceedances: N-SED-01, N-SED-04, N-SED-06, N-SED-07
 S-SED-01, S-SED-02, S-SED-04, S-SED-05

Figure 2
(Transmitted electronically as a separate Adobe pdf file)

Appendix A

Study Area Photos



July 2004 Sediment Sampling—North Tributary

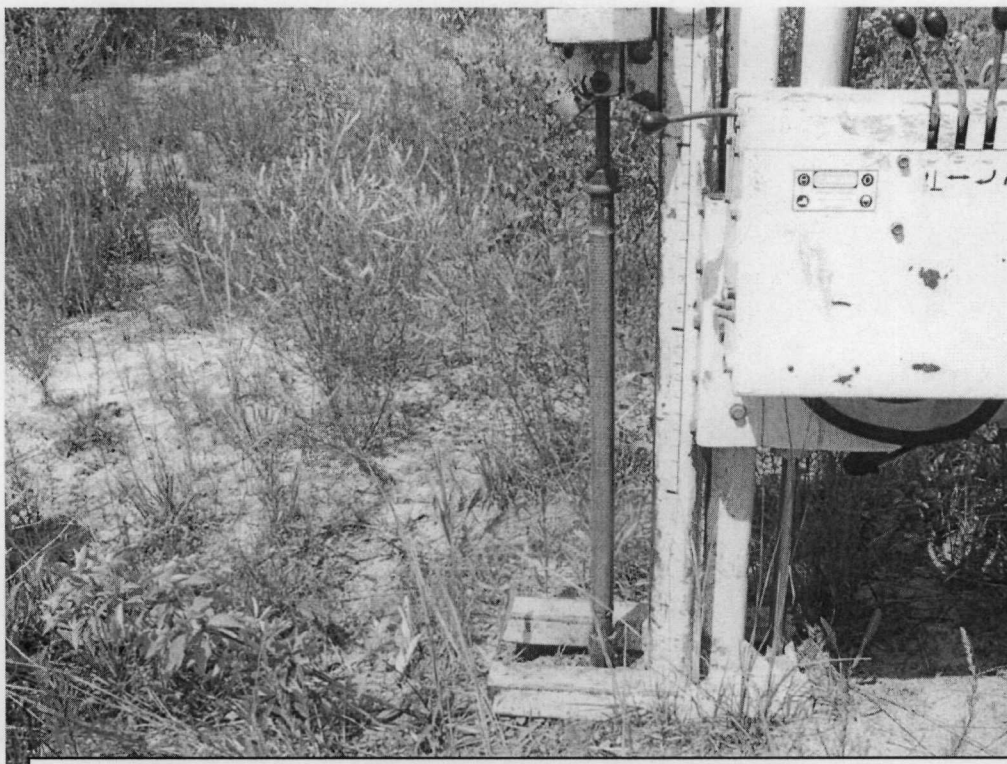


Photo of well installation work during July 2004 Site Investigation



Typical Sample Core (Above) & Habitat Protection
Survey Markers (Bottom) July 2004

Appendix B

Soil Boring/Monitoring Well Logs



Appendix C

Laboratory Data Reports